Massachusetts Water Resource Authority Employees' Retirement System

Actuarial Valuation and Review as of January 1, 2015

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April 28, 2015

Retirement Board
Massachusetts Water Resource Authority Employees' Retirement System
Two Griffin Way
Chelsea, MA 02150

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2015. It summarizes the actuarial data used in the valuation, establishes the funding requirements for fiscal 2016 and later years and analyzes the preceding two years' experience.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Retirement System. The census information and financial information on which our calculations were based was prepared by the staff of the MWRA Employees' Retirement System. That assistance is gratefully acknowledged.

The measurements shown in this actuarial valuation may not be applicable for other purposes. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period); and changes in plan provisions or applicable law.

An actuarial valuation is a measurement at a specific date – it is not a prediction of a plan's future financial condition. We have not been retained to perform an analysis of the potential range of financial measurements, except where otherwise noted.

The actuarial calculations were directed under the supervision of Kathleen A. Riley, FSA, MAAA, EA. She is a member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of her knowledge, the information supplied in the actuarial valuation is complete and accurate. Further, in her opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the Plan.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,

Segal Consulting, a Member of The Segal Group, Inc.

By: _____ _____

Kathleen A. Riley, FSA, MAAA, EA
Senior Vice President and Actuary

William J. Connolly, FCA, MAAA, EA
Consulting Actuary

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SECTION 1

VALUATION SUMMARY

SECTION 2

VALUATION RESULTS

SECTION 3

SUPPLEMENTAL INFORMATION

SECTION 4

REPORTING INFORMATION

SECTION 5

GASB INFORMATION

Purpose

This report has been prepared by Segal Consulting to present a valuation of the Massachusetts Water Resource Authority Employees' Retirement System as of January 1, 2015. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits. The contribution requirements presented in this report are based on:

- The benefit provisions of Massachusetts General Law Chapter 32;
- The characteristics of covered active participants, inactive participants, and retired participants and beneficiaries as of January 1, 2015;
- The assets of the Plan as of December 31, 2014;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

Significant Issues in Valuation Year

The following key findings were the result of this actuarial valuation:

1. The actuarial valuation report as of January 1, 2015 is based on financial information as of that date. Changes in the value of assets subsequent to that date are not reflected.
2. During the plan years ended 2013 and 2014, the market value rates of return were 15.96% and 4.44%, respectively. Because the actuarial value of assets gradually recognizes market value fluctuations over a five-year period, the actuarial rate of return for the plan years ended 2013 and 2014 were 11.86% and 9.44%, respectively. The actuarial value of assets as of December 31, 2014 was $435.8 million, or 98.6% of the market value of assets of $441.8 million reported in the Annual Statement. As of December 31, 2012, the actuarial value of assets was 97.4% of the market value.
3. As indicated in Section 2, the total unrecognized investment gain as of December 31, 2014 is $5,979,205. This investment gain will be recognized in the determination of the actuarial value of assets for funding purposes in the next few years, to the extent it is not offset by recognition of investment losses derived from future experience. This implies that earning the assumed rate of return on a market value basis will result in investment gains on the actuarial value of assets in the next few years. Because the unrecognized gain is relatively small, the deferred gains are not reflected in the funding schedule in Section 2, Chart 16.

4. This valuation reflects the following changes in assumptions:
   - The net investment return assumption was lowered from 8.00% to 7.75%.
   - The administrative expense assumption was increased from $390,000 for calendar 2013 to $525,000 for calendar 2015.
   - The pre-retirement mortality assumption was changed from the RP-2000 Mortality Table projected 13 years using Scale AA to the RP-2000 Employee Mortality Table projected generationally from 2005 with Scale AA.
   - The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Mortality Table projected 13 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2005 with Scale AA.
   - The mortality assumption for disabled participants was changed from the RP-2000 Mortality Table set forward 2 years projected 13 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table set forward 2 years projected generationally from 2005 with Scale AA.
   - The retirement rates were reduced by 25%.
   - The salary increase assumption was changed as follows:

	Rate	
Years of Service	Current	Previously
0	6.00%	7.00%
1	5.50%	6.50%
2	5.50%	6.50%
3	5.25%	6.00%
4	5.25%	6.00%
5	4.75%	5.50%
6	4.75%	5.50%
7	4.50%	5.00%
8	4.50%	5.00%
9+	4.25%	4.75%

- The reduction in liability to account for anticipated net 3(8)(c) reimbursements was increased from $5.2 million to $7.2 million based on the average net 3(8)(c) payments in 2013 and 2014.

Changing these assumptions resulted in a net increase in the unfunded liability of $4.9 million and a decrease in the employer normal cost of $179,000.

5. The unfunded liability has decreased from $43.8 million as of January 1, 2013 to $7.6 million as of January 1, 2015. After reflecting the additional contributions made in 2013 and 2014, the unfunded liability was expected to decrease to $30.8 million. The difference between the expected unfunded liability of $30.8 million and the actual unfunded liability of $7.6 million is $23.2 million and is attributable to an investment gain on an actuarial basis of $20.1 million over the two-year period, a gain from salary increases less than expected of $6.4 million and a miscellaneous gain of $1.6 million, partially offset by assumption changes increasing the liability by $4.9 million as described below.
6. The contribution for fiscal 2016 is equal to the previously budgeted amount of $8,159,521. The results of this valuation will first be reflected in the fiscal 2017 appropriation.

   The funding schedule adopted by the board with the prior valuation fully funds the System by fiscal 2024 with amortization payments that increase 4.5% per year. Chart 16 shows the recommended contribution through fiscal 2024 based on this funding schedule. The fiscal 2017 appropriation is $3,132,624. The appropriation is projected to increase approximately 4.6% per year through fiscal 2024.
7. On a market value basis, the funded ratio has increased from 91.0% as of January 1, 2013 to 99.6% as of January 1, 2015. On an actuarial basis, the funded ratio has increased from 88.6% as of January 1, 2013 to 98.3% as of January 1, 2015.
8. Section 5 shows the disclosure information required by GASB Statements No. 67 and 68 for the fiscal year ended June 30, 2015.

Summary of Key Valuation Results

	2015	2013
Contributions for fiscal year beginning July 1:		
Recommended for fiscal 2016 and 2014	$8,159,521	$5,903,107
Recommended for fiscal 2017 and 2015	3,132,624	7,808,155
Recommended for fiscal 2018 and 2016	3,277,369	8,159,521
Actual contribution for fiscal 2014	- -	12,431,514
Actual contribution for fiscal 2015	- -	12,629,475
Funding elements for plan year beginning January 1:		
Normal cost, including administrative expenses	$11,162,881	$10,466,083
Market value of assets	441,820,644	350,504,657
Actuarial value of assets	435,841,439	341,515,023
Actuarial accrued liability	443,487,357	385,296,073
Unfunded actuarial accrued liability	7,645,918	43,781,050
Funded ratio using actuarial value of assets	98.3%	88.6%
Funded ratio using market value of assets	99.6%	91.0%
Demographic data for plan year beginning January 1:		
Number of retired participants and beneficiaries	476	397
Number of inactive participants with a vested right to a deferred or immediate benefit	48	51
Number of inactive participants entitled to a return of their employee contributions	47	55
Number of active participants	1,090	1,091
Total payroll	$85,537,485	$80,893,018
Average payroll	78,475	74,146

A. PARTICIPANT DATA

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active participants, inactive participants, retired participants and beneficiaries.

This section presents a summary of significant statistical data on these participant groups.

More detailed information for this valuation year and the preceding valuation can be found in Section 3, Exhibits A and B.

A historical perspective of how the participant population has changed over the past four valuations can be seen in this chart.

CHART 1

Participant Population: 2009 – 2014

Year Ended December 31	Active Participants	Inactive Participants	Retired Participants and Beneficiaries	Ratio of Non-Actives to Actives
2009	1,108	114	313	0.39
2010	1,110	102	341	0.40
2012	1,091	106	397	0.46
2014	1,090	95	476	0.52

Active Participants
Plan costs are affected by the age, years of service and payroll of active participants. In this year's valuation, there were 1,090 active participants with an average age of 51.9, average years of service of 18.2 years and average payroll of $78,475. The 1,091 active participants in the prior valuation had an average age of 51.8, average service of 18.0 years and average payroll of $74,146.

Among the active participants, there were none with unknown age and/or service information.

Inactive Participants
In this year's valuation, there were 48 participants with a vested right to a deferred or immediate vested benefit and 47 participants entitled to a return of their employee contributions.

These graphs show a distribution of active participants by age and by years of service.

CHART 2

Distribution of Active Participants by Age as of December 31, 2014

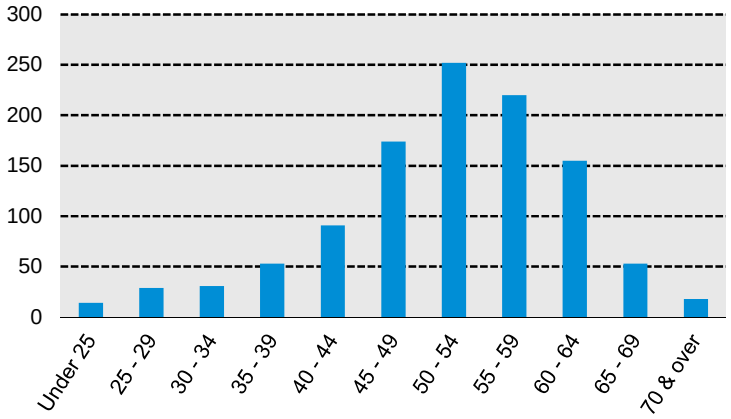
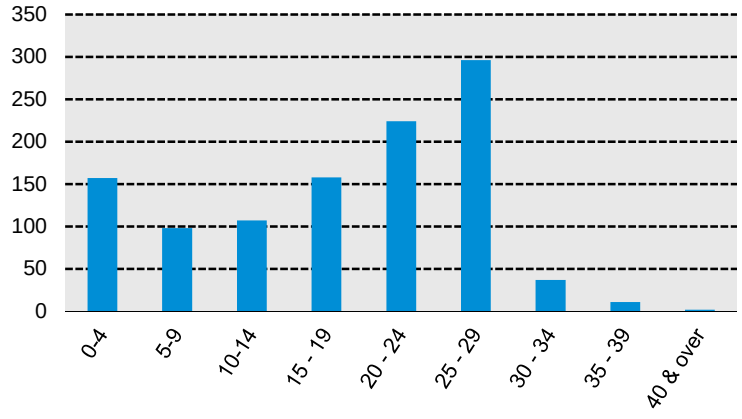


CHART 3

Distribution of Active Participants by Years of Service as of December 31, 2014



Retired Participants and Beneficiaries

As of December 31, 2014, 415 retired participants and 61 beneficiaries were receiving total monthly benefits of $1,214,815. For comparison, in the previous valuation, there were 348 retired participants and 49 beneficiaries receiving monthly benefits of $922,155.

These graphs show a distribution of the current retired participants and beneficiaries based on their monthly amount and age, by type of pension.

CHART 4

Distribution of Retired Participants and Beneficiaries by Type and by Monthly Amount as of December 31, 2014

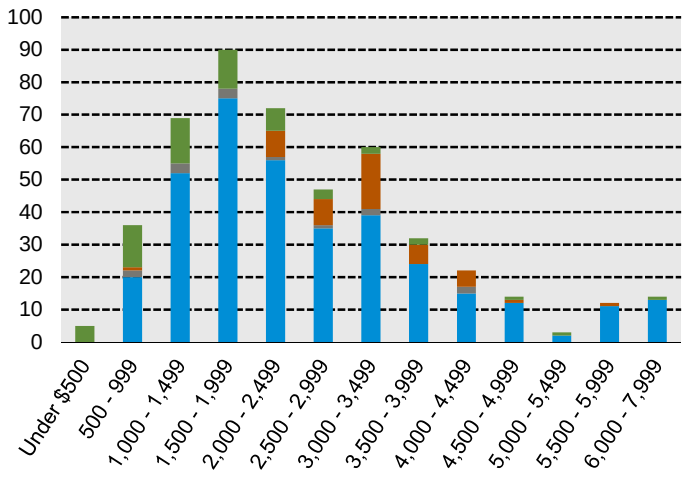
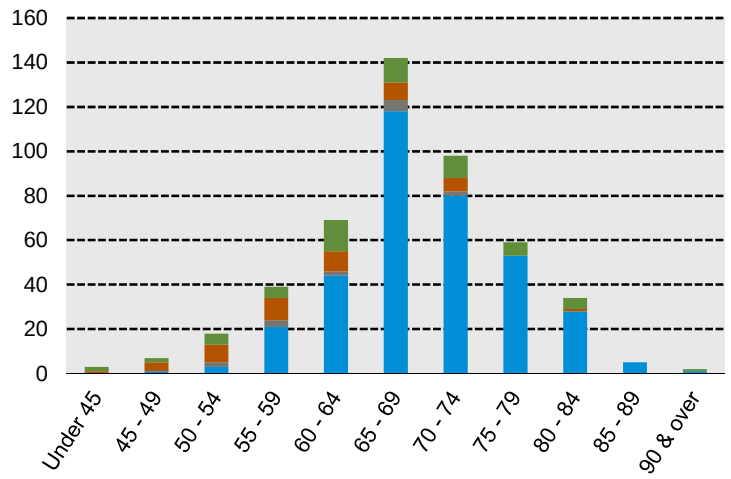


CHART 5

Distribution of Retired Participants and Beneficiaries by Type and by Age as of December 31, 2014



B. FINANCIAL INFORMATION

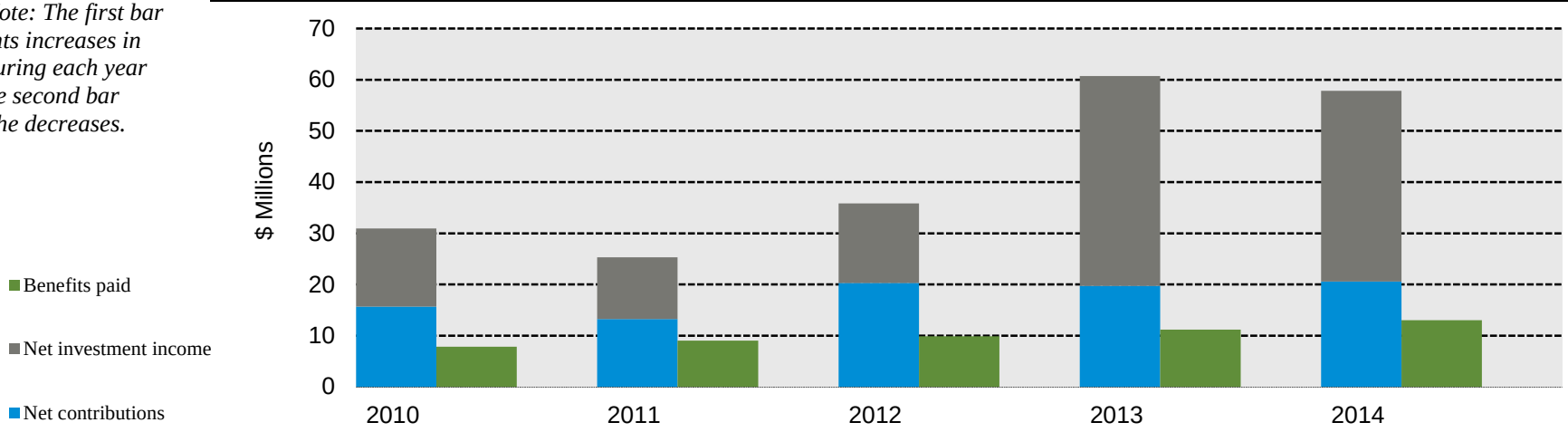
Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and net investment earnings (less investment fees) will be needed to cover benefit payments.

Retirement plan assets change as a result of the net impact of these income and expense components. Additional financial information, including a summary of these transactions for the valuation year, is presented in Section 3, Exhibits C and D.

The chart depicts the components of changes in the actuarial value of assets over the last five years. Note: The first bar represents increases in assets during each year while the second bar details the decreases.

CHART 6

Comparison of Increases and Decreases in the Actuarial Value of Assets for Years Ended December 31, 2010 – 2014



It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable.

The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

The chart shows the determination of the actuarial value of assets as of the valuation date.

CHART 7

Determination of Actuarial Value of Assets

		Year Ended	
		December 31, 2014	**December 31, 2013**
1. Market value of assets, December 31, 2014		$441,820,644	$415,677,038
	Original	Unrecognized	Unrecognized
2. Calculation of unrecognized return	Amount	Return	Return
(a) Year ended December 31, 2014	-$14,931,148	-$11,944,919	N/A
(b) Year ended December 31, 2013	28,255,206	16,953,124	$22,604,165
(c) Year ended December 31, 2012	13,366,332	5,346,533	8,019,799
(d) Year ended December 31, 2011	-21,877,664	-4,375,533	-8,751,066
(e) Year ended December 31, 2010	13,704,919	0	2,740,984
(f) Total unrecognized return		5,979,205	24,613,882
3. Preliminary actuarial value: (1) - (2f)		435,841,439	391,063,156
4. Adjustment to be within 10% corridor		0	0
5. Final actuarial value of assets as of December 31, 2014: (3) + (4)		$435,841,439	$391,063,156
6. Actuarial value as a percentage of market value: (5) ÷ (1)		98.6%	94.1%
7. Amount deferred for future recognition: (1) - (5)		5,979,205	$24,613,882

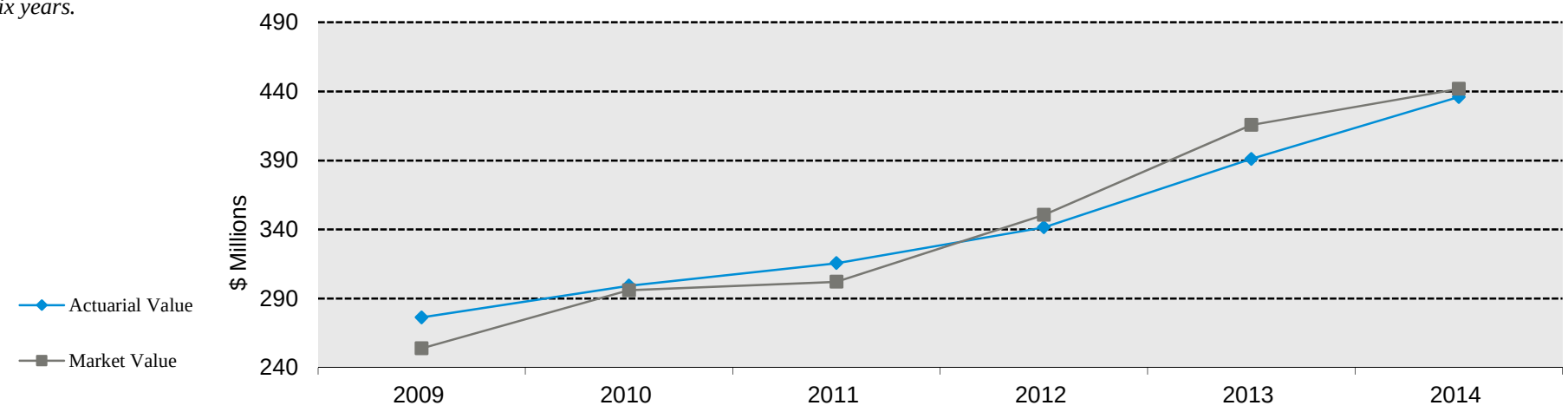
Note: Unrecognized return is the difference between the total return and expected return on a market value basis and is recognized over a five-year period.

Both the actuarial value and market value of assets are representations of the MWRA Employees' Retirement System's financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because the MWRA Employees' Retirement System's liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

This chart shows the change in the actuarial value of assets versus the market value over the past six years.

CHART 8

Actuarial Value of Assets vs. Market Value of Assets as of December 31, 2009 – 2014



C. ACTUARIAL EXPERIENCE

To calculate the required contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), the contribution requirement will decrease from the previous year. On the other hand, the contribution requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The net experience gain for the two-year period ending December 31, 2014 is $28,089,050. A discussion of the major components of the actuarial experience is on the following pages.

This chart provides a summary of the actuarial experience over the past two years.

CHART 9

Actuarial Experience for Two-Year Period Ended December 31, 2014

1.	Net gain from investments*	$20,090,768
2.	Net loss from administrative expenses	-22,467
3.	Net gain from other experience**	8,020,749
4.	Net experience gain: (1) + (2) + (3)	$28,089,050

* *Details in Chart 10*

** *Details in Chart 13*

Investment Rate of Return

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the MWRA Employees' Retirement System's investment policy. For valuation purposes, the assumed rate of return on the actuarial value of assets was 8.00% for the years ending December 31, 2013 and December 31, 2014. The actual rates of return on an actuarial basis for the 2014 and 2013 plan years were 9.44% and 11.86%, respectively.

Since the actual return for the year was greater than the assumed return, the MWRA Employees' Retirement System experienced an actuarial gain of $20,090,768, including an adjustment for interest, with regard to its investments.

This chart shows the gain/(loss) due to investment experience.

CHART 10

Actuarial Value Investment Experience

	Year Ended December 31, 2014	Year Ended December 31, 2013
1. Actual return	$37,258,484	$41,012,736
2. Average value of assets	394,823,055	345,782,721
3. Actual rate of return: (1) ÷ (2)	9.44%	11.86%
4. Assumed rate of return	8.00%	8.00%
5. Expected return: (2) x (4)	$31,585,844	$27,662,617
6. Actuarial gain/(loss): (1) – (5)	$5,672,640	$13,350,119

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the market value investment return for the last six years, including the five-year average.

Based upon this experience and future expectations, we have lowered the assumed rate of return from 8.00% to 7.75%.

CHART 11

Investment Return – Actuarial Value vs. Market Value: 2010 - 2014

Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent
2009	N/A	21.45%	N/A	22.49%
2010	15,233,758	5.44	$34,324,480	13.32
2011	12,041,642	3.99	1,969,318	0.66
2012	15,544,568	4.85	37,954,768	12.35
2013	41,012,736	11.86	56,636,985	15.96
2014	37,258,484	9.44	18,623,808	4.44
Total	$121,091,188		$149,509,359	
	Five-year average return:	7.37%		9.13%

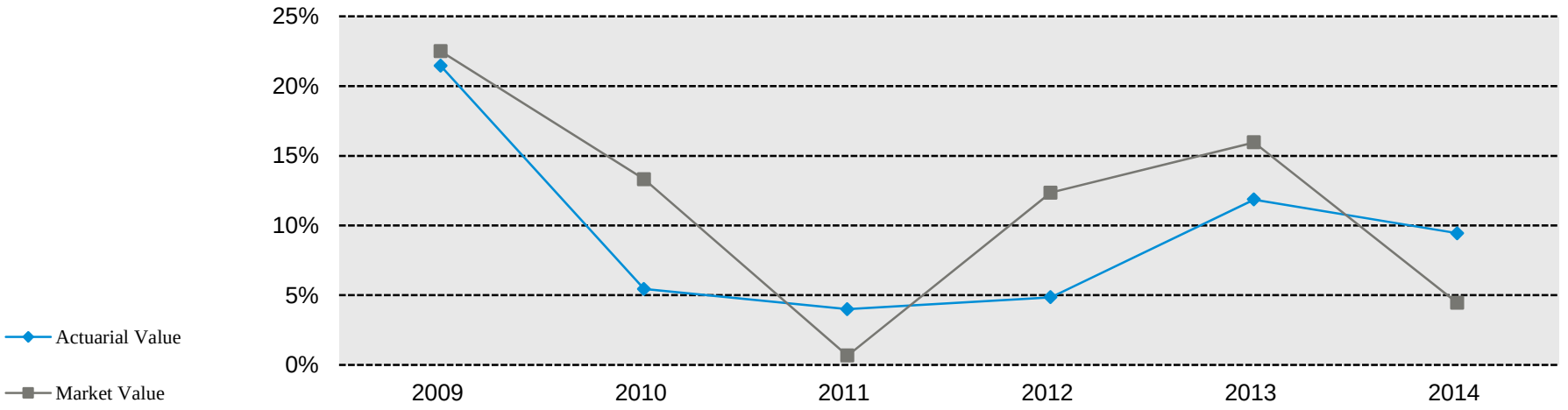
Notes: Each year's yield is weighted by the average asset value in that year.
Returns are net of investment and administrative expenses prior to 2013 and net of investment expenses thereafter.

Subsection B described the actuarial asset valuation method that gradually takes into account fluctuations in the market value rate of return. The effect of this is to stabilize the actuarial rate of return, which contributes to leveling pension plan costs.

This chart illustrates how this leveling effect has actually worked over the years 2009 - 2014.

CHART 12

Market and Actuarial Rates of Return for Years Ended December 31, 2009 - 2014



Administrative Expenses
Administrative expenses for the years ended December 31, 2013 and 2014 were $410,778 and $407,574, respectively, compared to the assumption of $390,000 for calendar year 2013 and $407,550 for calendar year 2014. This resulted in a loss of $22,467 over the two-year period. Based on budgeted expenses provided by the System, we have increased the assumption to $525,000 for the 2015 calendar year, increasing 4.00% per year, thereafter.

Other Experience
There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among the participants,
- retirement experience (earlier or later than expected),
- mortality (more or fewer deaths than expected),
- the number of disability retirements, and
- salary increases different than assumed.

The net gain from this other experience for the two-year period ending December 31, 2014 amounted to $8,020,749, which is 1.8% of the actuarial accrued liability.

A brief summary of the demographic gain/(loss) experience of the MWRA Employees' Retirement System for the two-year period ending December 31, 2014 is shown in the chart below.

This valuation reflects the following changes in assumptions:

- The net investment return assumption was lowered from 8.00% to 7.75%.
- The administrative expense assumption was increased from $390,000 for calendar 2013 to $525,000 for calendar 2015.
- The pre-retirement mortality assumption was changed from the RP-2000 Mortality Table projected 13 years using Scale AA to the RP-2000 Employee Mortality Table projected generationally from 2005 with Scale AA.
- The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Mortality Table projected 13 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2005 with Scale AA.

The chart shows elements of the experience gain/(loss) for the most recent years.

CHART 13

Experience Due to Changes in Demographics for Two-Year Period Ended December 31, 2014

1.	Salary increase less than expected for continuing actives	$6,394,881
2.	Miscellaneous experience gain, including fewer retirements than expected	1,625,868
3.	Total	$8,020,749

- The mortality assumption for disabled participants was changed from the RP-2000 Mortality Table set forward 2 years projected 13 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table set forward 2 years projected generationally from 2005 with Scale AA.
- The retirement rates were reduced by 25%.
- The salary increase assumption was changed as follows:

Years of Service	Rate	
	Current	Previously
0	6.00%	7.00%
1	5.50%	6.50%
2	5.50%	6.50%
3	5.25%	6.00%
4	5.25%	6.00%
5	4.75%	5.50%
6	4.75%	5.50%
7	4.50%	5.00%
8	4.50%	5.00%
9+	4.25%	4.75%

- The reduction in liability to account for anticipated net 3(8)(c) reimbursements was increased from $5.2 million to $7.2 million based on the average net 3(8)(c) payments in 2013 and 2014.

Changing these assumptions resulted in a net increase in the unfunded liability of $4.9 million and a decrease in the employer normal cost of $179,000. We will continue to monitor these assumptions and may make revisions in a future valuation.

After reflecting the additional contributions made in 2013 and 2014, the unfunded liability was expected to decrease from $43.8 million as of January 1, 2013 to $30.8 million as of January 1, 2015. The actuarial unfunded liability as of January 1, 2015 of $7.6 million is $23.2 million lower than expected as detailed in Chart 14 below.

CHART 14

Development of Unfunded Actuarial Accrued Liability and (Gain)/Loss

	Year Ended December 31, 2014	Year Ended December 31, 2013
1. Unfunded actuarial accrued liability at beginning of year	$37,721,430	$43,781,050
2. Normal cost at beginning of year	10,937,057	10,466,083
3. Total contributions	-20,978,411	-20,137,363
4. Interest		
(a) For whole year on (1) + (2)	$3,892,679	$4,339,771
(b) For half year on (3)	-758,522	-728,111
(c) Total interest	3,134,157	3,611,660
5. Expected unfunded actuarial accrued liability	$30,814,233	$37,721,430
6. Changes due to:		
(a) Net experience gain	-$28,089,050	- -
(b) Assumption changes	4,920,735	- -
(c) Total changes	-23,168,315	- -
7. Unfunded actuarial accrued liability at end of year	$7,645,918	- -

D. RECOMMENDED CONTRIBUTION

The amount of annual contribution required to fund the Plan is comprised of an employer normal cost payment and a payment on the unfunded actuarial accrued liability.

The contribution for fiscal 2016 is equal to the previously budgeted amount of $8,159,521. The results of this valuation will first be reflected in the fiscal 2017 appropriation.

The funding schedule adopted by the board with the prior valuation fully funds the System by fiscal 2024 with amortization payments that increase 4.5% per year. Chart 16 shows the recommended contribution through fiscal 2024 based on this funding schedule. The fiscal 2017 appropriation is $3,132,624. The appropriation is projected to increase approximately 4.6% per year through fiscal 2024.

The chart compares this valuation's recommended contribution with the prior valuation.

CHART 15

Recommended Contribution

	Year Beginning January 1			
	2015		2013	
	Amount	% of Payroll	Amount	% of Payroll
1. Total normal cost	$10,637,881	11.93%	$10,076,083	11.88%
2. Administrative expenses	525,000	0.59%	390,000	0.46%
3. Expected employee contributions	-8,567,063	-9.61%	-8,065,358	-9.51%
4. Employer normal cost: (1) + (2) + (3)	$2,595,818	2.91%	$2,400,725	2.83%
5. Actuarial accrued liability	443,487,357		385,296,073	
6. Actuarial value of assets	435,841,439		341,515,023	
7. Unfunded actuarial accrued liability: (5) - (6)	$7,645,918		$43,781,050	
8. Employer normal cost projected to July 1, 2015 and 2013, adjusted for timing	2,647,225	2.91%	2,454,147	2.83%
9. Projected unfunded actuarial accrued liability	7,936,670		45,498,602	
10. Payment on projected unfunded actuarial accrued liability, adjusted for timing	5,512,296	6.06%	3,446,960	3.98%
11. Recommended contribution: (8) + (10)	$8,159,521	8.97%	$5,901,107	6.81%
12. Projected payroll	$90,934,803		$86,716,684	

Notes: Recommended contributions are assumed to be paid on July 1.
Recommended contributions are set equal to budgeted amounts determined with the prior valuation.

Chart 16

Funding Schedule – Fully Funded by June 30, 2024 with amortization payments increasing 4.5% per year

(1) Fiscal Year Ended June 30	(2) Employer Normal Cost	(3) Amortization of Unfunded Actuarial Accrued Liability	(4) Total Appropriation: (2) + (3)	(5) Unfunded Actuarial Accrued Liability at Beginning of Fiscal Year	(6) Percent Increase Over Prior Year's Appropriation
2016	$2,647,225	$5,512,296	$8,159,521	$7,936,670	- -
2017	2,770,038	362,586	3,132,624	2,612,263	-61.61%
2018	2,898,466	378,903	3,277,369	2,424,026	4.62%
2019	3,032,765	395,953	3,428,718	2,203,620	4.62%
2020	3,173,198	413,771	3,586,969	1,947,761	4.62%
2021	3,320,044	432,391	3,752,435	1,652,874	4.61%
2022	3,473,591	451,848	3,925,439	1,315,070	4.61%
2023	3,634,142	472,182	4,106,324	930,121	4.61%
2024	3,802,013	493,430	4,295,443	493,430	4.61%

Notes: Recommended contributions are assumed to be paid on July 1.
Normal cost increases at 4.0% per year, plus an additional increase for the impact of generational mortality.
Amortization payments increase at 4.5% per year.
Assumes contribution of budgeted amount for fiscal year 2016.

EXHIBIT A

Table of Plan Coverage

Category	Year Ended December 31 2014	2012	Change From Prior Year
Active participants in valuation:			
Number	1,090	1,091	-0.1%
Average age	51.9	51.8	N/A
Average years of service	18.2	18.0	N/A
Total payroll	$85,537,485	$80,893,018	5.7%
Average payroll	78,475	74,146	5.8%
Member contributions	108,668,016	103,687,918	4.8%
Inactive participants entitled to a return of employee contributions	47	55	-14.5%
Inactive participants with a vested right to a deferred or immediate benefit	48	51	-5.9%
Retired participants:			
Number in pay status	354	293	20.8%
Average age	69.8	69.2	N/A
Average monthly benefit	$2,626	$2,375	10.6%
Disabled participants:			
Number in pay status	61	55	10.9%
Average age	60.6	58.6	N/A
Average monthly benefit	$2,972	$2,832	4.9%
Beneficiaries in pay status:			
Number in pay status	61	49	24.5%
Average age	65.1	66.3	N/A
Average monthly benefit	$1,702	$1,441	18.1%

EXHIBIT B

Participants in Active Service as of December 31, 2014
By Age, Years of Service, and Average Payroll

		Years of Service								
Age	**Total**	**0-4**	**5-9**	**10-14**	**15 - 19**	**20 - 24**	**25 - 29**	**30 - 34**	**35 - 39**	**40 & over**
Under 25	14	14	- -	- -	- -	- -	- -	- -	- -	- -
	$46,270	$46,270	- -	- -	- -	- -	- -	- -	- -	- -
25 - 29	29	22	6	1	- -	- -	- -	- -	- -	- -
	$49,359	$46,050	$58,323	$68,381	- -	- -	- -	- -	- -	- -
30 - 34	31	20	9	2	- -	- -	- -	- -	- -	- -
	$61,632	$60,300	$61,972	$73,431	- -	- -	- -	- -	- -	- -
35 - 39	53	20	15	13	4	1	- -	- -	- -	- -
	$61,869	$52,553	$64,113	$68,283	$71,518	$92,548	- -	- -	- -	- -
40 - 44	91	20	16	13	20	19	3	- -	- -	- -
	$76,131	$62,279	$66,674	$88,350	$80,913	$84,993	$77,962	- -	- -	- -
45 - 49	174	20	14	18	34	47	41	- -	- -	- -
	$74,761	$56,629	$61,584	$73,454	$77,914	$82,236	$77,494	- -	- -	- -
50 - 54	252	19	16	18	31	54	99	14	1	- -
	$81,695	$58,941	$65,793	$72,223	$87,780	$87,362	$86,220	$76,267	$72,439	- -
55 - 59	220	13	12	20	32	50	76	12	5	- -
	$86,119	$62,859	$72,552	$77,166	$88,094	$87,843	$88,407	$103,927	$107,585	- -
60 - 64	155	6	6	17	28	37	52	8	1	- -
	$83,119	$79,098	$65,627	$82,163	$86,307	$79,010	$86,978	$85,151	$74,332	- -
65 - 69	53	3	4	3	5	12	17	3	4	2
	$84,808	$50,236	$67,648	$69,274	$81,049	$87,712	$86,969	$103,130	$118,029	$73,959
70 & over	18	- -	- -	2	4	4	8	- -	- -	- -
	$78,924	- -	- -	$63,014	$66,796	$85,072	$85,891	- -	- -	- -
Total	1,090	157	98	107	158	224	296	37	11	2
	$78,475	$56,423	$65,163	$76,146	$83,434	$84,814	$85,656	$89,337	$105,165	$73,959

EXHIBIT C

Summary Statement of Income and Expenses on an Actuarial Value Basis

	Year Ended December 31, 2014		Year Ended December 31, 2013	
Net assets at actuarial value at the beginning of the year		$391,063,156		$341,515,023
Contribution income:				
Employer contributions	$12,629,475		$12,431,514	
Employee contributions	8,332,936		7,690,025	
Other contributions	16,000		15,824	
Less administrative expenses	-407,574		-410,778	
Net contribution income		20,570,837		19,726,585
Net investment income		37,258,484		41,012,736
Total income available for benefits		$57,829,321		$60,739,321
Less benefit payments:				
Pensions	-$10,408,798		-$9,136,141	
Net 3(8)(c) reimbursements	818,583		654,304	
Refunds, annuities, & Option B refunds	-3,467,823		-2,709,351	
Workers Compensation	7,000		0	
Net benefit payments		-$13,051,038		-$11,191,188
Change in reserve for future benefits		$44,778,283		$49,548,133
Net assets at actuarial value at the end of the year		$435,841,439		$391,063,156

EXHIBIT D

Development of the Fund Through December 31, 2014

Year Ended December 31	Employer Contributions	Employee Contributions	Other Contributions	Net Investment Return*	Administrative Expenses	Benefit Payments	Actuarial Value of Assets at End of Year
2010	$8,136,240	$7,563,665	$13,815	$15,233,758	$0	$7,885,963	$299,331,117
2011	5,488,792	7,734,335	22,732	12,041,642	0	9,037,060	315,581,558
2012	12,326,022	7,952,164	15,871	15,544,568	0	9,905,160	341,515,023
2013	12,431,514	7,690,025	15,824	41,012,736	410,778	11,191,188	391,063,156
2014	12,629,475	8,332,936	16,000	37,258,484	407,574	13,051,038	435,841,439

** Net of investment fees for 2013 and later and net of investment fees and administrative expenses prior to 2013.*

EXHIBIT E

Definitions of Pension Terms

The following list defines certain technical terms for the convenience of the reader:

Assumptions or actuarial assumptions: The estimates on which the cost of the Plan is calculated including:

(a) Investment return — the rate of investment yield that the Plan will earn over the long-term future;

(b) Mortality rates — the death rates of employees and pensioners; life expectancy is based on these rates;

(c) Retirement rates — the rate or probability of retirement at a given age;

(d) Turnover rates — the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement.

Normal cost: The amount of contributions required to fund the benefit allocated to the current year of service.

Actuarial accrued liability for actives: The equivalent of the accumulated normal costs allocated to the years before the valuation date.

Actuarial accrued liability for pensioners: The single sum value of lifetime benefits to existing pensioners. This sum takes account of life expectancies appropriate to the ages of the pensioners and the interest that the sum is expected to earn before it is entirely paid out in benefits.

Unfunded actuarial accrued liability: The extent to which the actuarial accrued liability of the Plan exceeds the assets of the Plan. There are many approaches to paying off the unfunded actuarial accrued liability, from meeting the interest accrual only to amortizing it over a specific period of time.

Amortization of the unfunded actuarial accrued liability: Payments made over a period of years equal in value to the Plan's unfunded actuarial accrued liability.

Investment return: The rate of earnings of the Plan from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.

EXHIBIT I

Summary of Actuarial Valuation Results

The valuation was made with respect to the following data supplied to us:			
1.	Retired participants as of the valuation date (including 61 beneficiaries in pay status)		476
2.	Participants active during the year ended December 31, 2014 with total accumulated contributions of $108,668,016 and projected 2015 payroll of $89,168,911		1,090
3.	Inactive participants with a right to a return of their employee contributions as of December 31, 2014		47
4.	Inactive participants with a vested right to a deferred or immediate benefit as of December 31, 2014		48
The actuarial factors as of January 1, 2015 are as follows:			
1.	Normal cost, including administrative expenses		$11,162,881
2.	Expected employee contributions		-8,567,063
3.	Employer normal cost: (1) + (2)		$2,595,818
4.	Actuarial accrued liability		443,487,357
	Retired participants and beneficiaries	$142,699,213	
	Active participants	289,585,038	
	Inactive participants	11,203,106	
5.	Actuarial value of assets ($441,820,644 at market value as reported in the Annual Statement)		435,841,439
6.	Unfunded actuarial accrued liability: (4) – (5)		7,645,918
The actuarial factors projected to July 1, 2015 are as follows:			
1.	Employer normal cost projected to July 1, 2015, adjusted for timing		$2,647,225
2.	Projected unfunded actuarial accrued liability		7,936,670
3.	Payment on projected unfunded actuarial accrued liability, adjusted for timing		5,512,296
4.	Preliminary recommended contribution: (1) + (3)		8,159,521
5.	Projected payroll		90,934,803
6.	Total budgeted appropriation as a percentage of projected payroll: (4) ÷ (5)		8.97%

Notes: Recommended contributions are assumed to be paid on July 1.
Recommended contributions are set equal to budgeted amounts determined with the prior valuation.

EXHIBIT II

Funded Ratio

A critical piece of information regarding the Plan's financial status is the funded ratio. This ratio compares the actuarial value of assets to the actuarial accrued liabilities of the Plan as calculated. High ratios indicate a well-funded plan with assets sufficient to cover the plan's actuarial accrued liabilities. Lower ratios may indicate recent changes to benefit structures, funding of the plan below actuarial requirements, poor asset performance, or a variety of other factors.

These measurements are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan’s benefit obligation or the need for or the amount of future contributions.

The chart below depicts a history of the funded ratios for this plan. On a market value basis, the funded ratio has increased from 91.00% as of January 1, 2013 to 99.6% as of January 1, 2015. On an actuarial basis, the funded ratio has increased from 88.6% as of January 1, 2013 to 98.3% as of January 1, 2015.

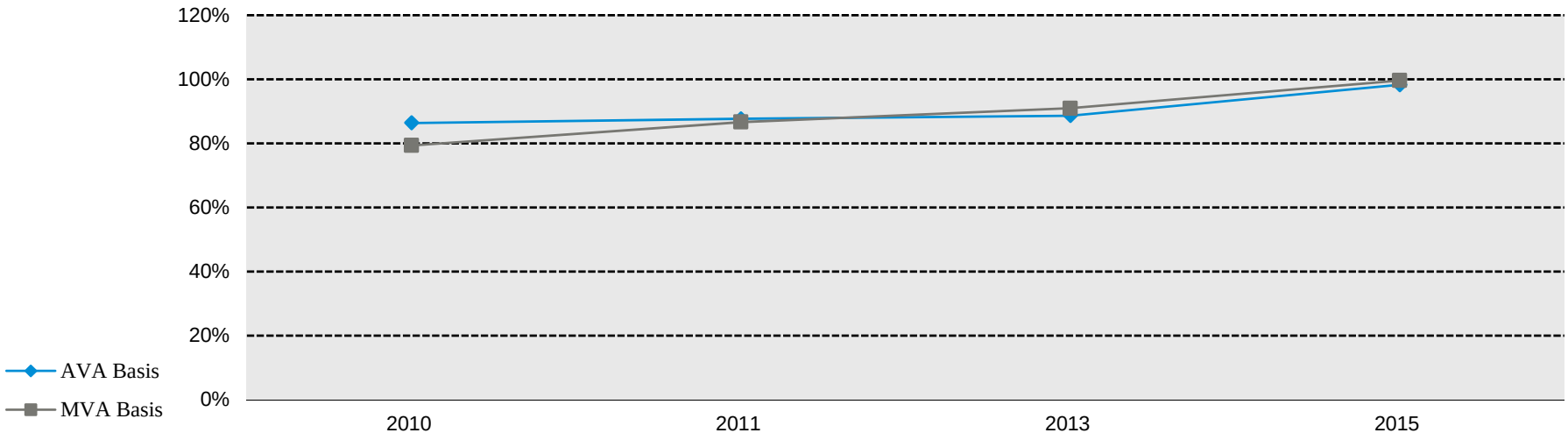


EXHIBIT III

Actuarial Assumptions and Actuarial Cost Method

Mortality Rates:

Pre-Retirement:	RP-2000 Employee Mortality Table projected generationally from 2005 with Scale AA (previously, RP-2000 Mortality Table projected 13 years using Scale AA)
Healthy:	RP-2000 Healthy Annuitant Mortality Table projected generationally from 2005 with Scale AA (previously, RP-2000 Mortality Table projected 13 years using Scale AA)
Disabled:	RP-2000 Healthy Annuitant Mortality Table set forward 2 years projected generationally from 2005 with Scale AA (previously, RP-2000 Mortality Table set forward 2 years projected 13 years using Scale AA)
	The mortality tables reasonably reflect the projected mortality experience of the Plan as of the measurement date based on historical and current demographic data. As part of the analysis, a comparison was made between the actual number of retiree deaths and the projected number based on the prior year's assumptions. The mortality tables were then adjusted to future years using generational projection under Scale AA to reflect future mortality improvement.

Termination Rates before Retirement:

	Rate (%)				
	Mortality				
	Current		Previously		
Age	Male	Female	Male	Female	Disability
20	0.03	0.02	0.03	0.02	0.01
25	0.04	0.02	0.03	0.02	0.02
30	0.04	0.03	0.04	0.02	0.03
35	0.08	0.05	0.07	0.04	0.05
40	0.11	0.07	0.10	0.06	0.10
45	0.15	0.11	0.13	0.09	0.15
50	0.21	0.17	0.17	0.13	0.19
55	0.30	0.25	0.28	0.24	0.24
60	0.49	0.39	0.55	0.47	0.28

Notes: Mortality rates do not reflect generational projection.
55% of the disability rates shown represent accidental disability.
40% of the accidental disabilities will die from the same cause as the disability.
55% of the death rates shown represent accidental death.

Withdrawal Rates:	Years of Service	Rate per year (%)
	0	15.0
	1	12.0
	2	10.0
	3	9.0
	4	8.0
	5	7.6
	6	7.5
	7	6.7
	8	6.3
	9	5.9
	10	5.4
	11	5.0
	12	4.6
	13	4.1
	14	3.7
	15	3.3
	16 – 20	2.0
	21 – 29	1.0
	30+	0.0

The termination rates and disability rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of terminations and disability retirements and the projected number based on the prior year's assumptions.

Retirement Rates:

	Rate per year (%)			
	Current		Previously	
Age	Male	Female	Male	Female
50	0.750	1.125	1.0	1.5
51	0.750	1.125	1.0	1.5
52	0.750	1.500	1.0	2.0
53	0.750	1.875	1.0	2.5
54	1.500	1.875	2.0	2.5
55	1.500	4.125	2.0	5.5
56	1.875	4.875	2.5	6.5
57	1.875	4.875	2.5	6.5
58	3.750	4.875	5.0	6.5
59	4.875	4.875	6.5	6.5
60	9.000	3.750	12.0	5.0
61	15.000	9.750	20.0	13.0
62	22.500	11.250	30.0	15.0
63	18.750	9.375	25.0	12.5
64	16.500	13.500	22.0	18.0
65	30.000	11.250	40.0	15.0
66	18.750	15.000	25.0	20.0
67	18.750	15.000	25.0	20.0
68	22.500	18.500	30.0	25.0
69	22.500	15.000	30.0	20.0
70	100.000	100.000	100.0	100.0

The retirement rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of retirements by age and the projected number based on the prior year’s assumptions.

Retirement Age for Inactive Vested Participants:	Age 55 The retirement age for inactive vested participants was based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment.
Unknown Data for Participants:	Same as those exhibited by participants with similar known characteristics.
Family Composition:	80% of participants are assumed to be married. None are assumed to have dependent children. Females are assumed to be three years younger than their spouses.
Benefit Election:	All participants are assumed to elect Option A. The benefit election reflects the fact that all benefit options are actuarially equivalent.
Net Investment Return:	7.75%, net of investment expenses (previously, 8.00% net of investment expenses) The net investment return assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes, as well as the Plan's target asset allocation.

Salary Increases:

	Rate	
Years of Service	**Current**	**Previously**
0	6.00%	7.00%
1	5.50%	6.50%
2	5.50%	6.50%
3	5.25%	6.00%
4	5.25%	6.00%
5	4.75%	5.50%
6	4.75%	5.50%
7	4.50%	5.00%
8	4.50%	5.00%
9+	4.25%	4.75%

The salary scale assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment.

Interest on Employee Contributions: 3.50%

Administrative Expenses: $525,000 for calendar 2015 based on budgeted expenses provided by the System, increasing 4.00% per year (previously, $390,000 for calendar 2013, increasing 4.50% per year).

2014 Salary: 2014 salaries are equal to salaries provided in the data, except for new hires where salaries were annualized based on date of hire.

Total Service: Total creditable service reported in the data.

Net 3(8)(c) Liability: Estimated based on the average annual net 3(8)(c) benefits of the prior two years ($7.2 million reduction for 2015) (previously, $5.2 million for 2013).

Actuarial Value of Assets: Market value of assets as reported in the System's Annual Statement less unrecognized return in each of the last five years. Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized over a five-year period, further adjusted, if necessary, to be within 10% of the market value.

Actuarial Cost Method:	Entry Age Normal Actuarial Cost Method. Entry Age is the age of the participant less Total Service as defined above. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary. Normal Cost is determined using the plan of benefits applicable to each participant.
Changes in Assumptions:	Based on past experience and future expectations, the following assumptions were changed as of January 1, 2015: ➢ The net investment return assumption was lowered from 8.00% to 7.75%. ➢ The administrative expense assumption was increased from $390,000 for calendar 2013 to $525,000 for calendar 2015. ➢ The pre-retirement mortality assumption was changed from the RP-2000 Mortality Table projected 13 years using Scale AA to the RP-2000 Employee Mortality Table projected generationally from 2005 with Scale AA. ➢ The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Mortality Table projected 13 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2005 with Scale AA. ➢ The mortality assumption for disabled participants was changed from the RP-2000 Mortality Table set forward 2 years projected 13 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table set forward 2 years projected generationally from 2005 with Scale AA. ➢ The retirement rates were reduced by 25%.

- The salary increase assumption was changed as follows:

	Rate	
Years of Service	Current	Previously
0	6.00%	7.00%
1	5.50%	6.50%
2	5.50%	6.50%
3	5.25%	6.00%
4	5.25%	6.00%
5	4.75%	5.50%
6	4.75%	5.50%
7	4.50%	5.00%
8	4.50%	5.00%
9+	4.25%	4.75%

- The reduction in liability to account for anticipated net 3(8)(c) reimbursements was increased from $5.2 million to $7.2 million based on the average net 3(8)(c) payments in 2013 and 2014.

EXHIBIT IV

Summary of Plan Provisions

This exhibit summarizes the major provisions of Chapter 32 of the Laws of Massachusetts.

Plan Year:	January 1 – December 31

Retirement Benefits

Employees covered by the Contributory Retirement Law are classified into one of four groups depending on job classification. Group 1 comprises most positions in state and local government. It is the general category of public employees. Group 4 comprises mainly police and firefighters. Group 2 is for other specified hazardous occupations. (Officers and inspectors of the State Police are classified as Group 3.)

For employees hired prior to April 2, 2012, the annual amount of the retirement allowance is based on the member's final three-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following table based on the age of the member at retirement:

	Age Last Birthday at Date of Retirement		
Percent	**Group 1**	**Group 2**	**Group 4**
2.5	65 or over	60 or over	55 or over
2.4	64	59	54
2.3	63	58	53
2.2	62	57	52
2.1	61	56	51
2.0	60	55	50
1.9	59	--	49
1.8	58	--	48
1.7	57	--	47
1.6	56	--	46
1.5	55	--	45

A member's final three-year average salary is defined as the greater of the highest consecutive three-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last three years of creditable service prior to retirement.

For employees hired on April 2, 2012 or later, the annual amount of the retirement allowance is based on the member's final five-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following tables based on the age and years of creditable service of the member at retirement:

For members with less than 30 years of creditable service:

Age Last Birthday at Date of Retirement

Percent	Group 1	Group 2	Group 4
2.50	67 or over	62 or over	57 or over
2.35	66	61	56
2.20	65	60	55
2.05	64	59	54
1.90	63	58	53
1.75	62	57	52
1.60	61	56	51
1.45	60	55	50

For members with 30 years of creditable service or greater:

Age Last Birthday at Date of Retirement

Percent	Group 1	Group 2	Group 4
2.500	67 or over	62 or over	57 or over
2.375	66	61	56
2.250	65	60	55
2.125	64	59	54
2.000	63	58	53
1.875	62	57	52
1.750	61	56	51
1.625	60	55	50

A member's final five-year average salary is defined as the greater of the highest consecutive five-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last five years of creditable service prior to retirement.

For employees who became members after January 1, 2011, regular compensation is limited to 64% of the federal limit found in 26 U.S.C. 401(a)(17). In addition, regular compensation for members who retire after April 2, 2012 will be limited to prohibit "spiking" of a member's salary to increase the retirement benefit.

For all employees, the maximum annual amount of the retirement allowance is 80 percent of the member's final average salary. Any member who is a veteran also receives an additional yearly retirement allowance of $15 per year of creditable service, not exceeding $300. The veteran allowance is paid in addition to the 80 percent maximum.

Employee Contributions

Date of Hire	Contribution Rate
Prior to January 1, 1975	5%
January 1, 1975 – December 31, 1983	7%
January 1, 1984 – June 30, 1996	8%
July 1, 1996 onward	9%

In addition, employees hired after December 31, 1978 contribute an additional 2 percent of salary in excess of $30,000.

Employees hired after 1983 who voluntarily withdraw their contributions with less than 10 ten years of credited service receive 3% interest on their contributions.

Employees in Group 1 hired on or after April 2, 2012 with 30 years of creditable service or greater will pay a base contribution rate of 6%.

Retirement Benefits (Superannuation)

Members of Group 1, 2 or 4 hired prior to April 2, 2012 may retire upon the attainment of age 55. For retirement at ages below 55, twenty years of creditable service is required.

	Members hired prior to April 2, 2012 who terminate before age 55 with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System). Members of Group 1 hired April 2, 2012 or later may retire upon the attainment of age 60. Members of Group 2 or 4 hired April 2, 2012 or later may retire upon the attainment of age 55. Members of Group 4 may retire upon attainment of age 50 with ten years of creditable service. Members hired April 2, 2012 or later who terminate before age 55 (60 for members of Group 1) with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (60 for members of Group 1) provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System.
Ordinary Disability Benefits	
	A member who is unable to perform his or her job due to a non-occupational disability will receive a retirement allowance if he or she has ten or more years of creditable service and has not reached age 55. The annual amount of such allowance shall be determined as if the member retired for superannuation at age 55 (age 60 for Group 1 members hired on or after April 2, 2012), based on the amount of creditable service at the date of disability. For veterans, there is a minimum benefit of 50 percent of the member's most recent year's pay plus an annuity based on his or her own contributions.
Accidental Disability Benefit	
	For a job-connected disability, the benefit is 72 percent of the member's most recent annual pay plus an annuity based on his or her own contributions, plus additional amounts for surviving children. Benefits are capped at 75 percent of annual rate of regular compensation for employees who become members after January 1, 1988.

Death Benefits

In general, the beneficiary of an employee who dies in active service will receive a refund of the employee's own contributions. Alternatively, if the employee were eligible to retire on the date of death, a spouse's benefit will be paid equal to the amount the employee would have received under Option C. The surviving spouse of a member who dies with two or more years of credited service has the option of a refund of the employee's contributions or a monthly benefit regardless of eligibility to retire, if they were married for at least one year. There is also a minimum widow's pension of $250 per month, and there are additional amounts for surviving children.

If an employee's death is job-connected, the spouse will receive 72 percent of the member's most recent annual pay, in addition to a refund of the member's accumulated deductions, plus additional amounts for surviving children. However, in accordance with Section 100 of Chapter 32, the surviving spouse of a police officer, firefighter or corrections officer is killed in the line of duty will be eligible to receive an annual benefit equal to the maximum salary held be the member at the time of death.

Upon the death of a job-connected disability retiree who retired prior to November 7, 1996 and could not elect an Option C benefit, a surviving spouse will receive an allowance of $6,000 if the member dies for a reason unrelated to the cause of disability.

"Heart And Lung Law" And Cancer Presumption

Any case of hypertension or heart disease resulting in total or partial disability or death to a uniformed fireman, permanent member of a police department, or certain employees of a county correctional facility is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. Any case of disease of the lungs or respiratory tract resulting in total disability or death to a uniformed fireman is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. There is an additional presumption for uniformed firemen that certain types of cancer are job-related if onset occurs while actively employed or within five years of retirement.

Options	Members may elect to receive a full retirement allowance payable for life under Option A. Under Option B a member may elect to receive a lower monthly allowance in exchange for a guarantee that at the time of death any contributions not expended for annuity payments will be refunded to the beneficiary. Option C allows the member to take a lesser retirement allowance in exchange for providing a survivor with two-thirds of the lesser amount. Option C pensioners will have benefits converted from a reduced to a full retirement if the beneficiary predeceases the retiree.
Post-Retirement Benefits	The Board has adopted the provisions of Section 51 of Chapter 127 of the Acts of 1999, which provide that the Retirement Board may approve an annual COLA in excess of the Consumer Price Index but not to exceed a 3% COLA on the first $12,000 of a retirement allowance.
Changes in Plan Provisions	None.

EXHIBIT 1

Net Pension Liability

The components of the net pension liability of the Massachusetts Water Resource Authority Employees' Retirement System at December 31, 2014 were as follows:

Total pension liability	$443,487,357
Plan fiduciary net position	441,820,644
System's net pension liability	1,666,713
Plan fiduciary net position as a percentage of the total pension liability	99.62%

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of December 31, 2014, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	4.0% for 2015 and later years
Salary increases	Based on years of service, ranging from 6.00% at 0 years of service decreasing to 4.25% after 9 years of service
Investment rate of return	7.75%, net of pension plan investment expense, including inflation
Cost of Living Adjustment	3% of first $12,000
Pre-Retirement:	RP-2000 Employee Mortality Table projected generationally from 2005 with Scale AA
Healthy Retiree:	RP-2000 Healthy Annuitant Mortality Table projected generationally from 2005 with Scale AA
Disabled Retiree:	RP-2000 Healthy Annuitant Mortality Table set forward twoyears projected generationally from 2005 with Scale AA

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of arithmetic real rates of return for each major asset class included in the pension plan's target asset allocation as of December 31, 2014 are summarized in the following table:

Asset Class	Long-Term Expected Real Rate of Return
Domestic equity	6.40%
International developed markets equity	7.07%
International emerging markets equity	9.26%
Core fixed income	1.53%
High-yield fixed income	4.25%
Real estate	4.30%
Commodities	3.77%
Hedge fund, GTAA, Risk parity	3.44%
Private equity	11.26%
Cash	0.96%

Discount rate sensitivity

Discount rate: The discount rate used to measure the total pension liability was 7.75%. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that contributions will be made at rates equal to the actuarially determined contribution rates. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability, calculated using the discount rate of 7.75%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.75%) or 1-percentage-point higher (8.75%) than the current rate:

	1% Decrease (6.75%)	Current Discount (7.75%)	1% Increase (8.75%)
Massachusetts Water Resource Authority Employees' Retirement System's net pension liability as of December 31, 2014	$58,976,677	$1,666,713	-$47,020,752

EXHIBIT 2

Schedule of Changes in the Net Pension Liability – Last Ten Years

	Year End December 31,									
	2014	**2013**	**2012**	**2011**	**2010**	**2009**	**2008**	**2007**	**2006**	**2005**
Total pension liability										
Service cost	$10,529,507									
Interest	33,583,751									
Differences between expected and actual experience	-8,288,503									
Changes of assumptions	4,920,735									
Changes of benefit terms	0			(Historical information prior to implementation of GASB 67/68 is not required)						
Benefit payments, including refunds of employee contributions	-13,051,038									
Net change in total pension liability	$27,694,452									
Total pension liability - beginning	415,792,905									
Total pension liability - ending (a)	$443,487,357									
Plan fiduciary net position										
Contributions - employer	$12,629,475									
Contributions - employee	8,332,936									
Net investment income	18,623,807									
Benefit payments, including refunds of employee contributions	-13,051,038			(Historical information prior to implementation of GASB 67/68 is not required)						
Administrative expenses	-407,574									
Other – Military Service Fund Contribution	16,000									
Net change in fiduciary net position	$26,143,606									
Plan fiduciary net position - beginning	415,677,038									
Plan fiduciary net position - ending (b)	$441,820,644									
Net pension liability – ending: (a)-(b)	$1,666,713									
Plan's fiduciary net position as a percentage of the total pension liability	99.62%			(Historical information prior to implementation of GASB 67/68 is not required)						
Covered-employee payroll	$88,646,339									
Net pension liability as a percentage of covered-employee payroll	1.88%									

EXHIBIT 3

Schedule of Contributions – Last Ten Years

	Year End December 31,									
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
Actuarially determined contribution*	$7,808,155*									
Contributions in relation to the actuarially determined contribution	12,629,475									
Contribution deficiency (excess)	$(4,821,320)									
Covered-employee payroll	$88,646,339									
Contributions as a percentage of covered-employee payroll	14.25%			(Historical information prior to implementation of GASB 67/68 is not required)						

* *Based on the results of the January 1, 2013 actuarial valuation (including assumptions and methods) which determined budged appropriation for fiscal 2015.*

EXHIBIT 4

Pension Expense and Deferred Outflows/Inflows of Resources Related to Pensions

A. Pension expense for the year ended December 31, 2014	Total
Service cost	$10,529,507
Interest on total pension liability	33,583,751
Contributions – employee	-8,332,936
Projected earnings on pension plan investments	-33,554,955
Administrative expenses	407,574
Recognized portion of current period plan between expected and actual experience	-1,381,417
Recognized portion of current period plan between projected and actual earnings on pension plan investments	2,986,230
Recognized portion of current year period assumption change	820,123
Recognized portion of current year period plan change	0
Recognition of deferred outflows of resources	0
Recognition of deferred inflows of resources	0
Pension expense for fiscal year ended June 30, 2015	$5,057,877

B. Deferred outflows/inflows of resources related to pensions	Total	
	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	$0	$6,907,087
Changes of assumptions	4,100,613	0
Changes of benefit terms	0	0
Net difference between projected and actual earnings on pension plan investments	11,944,918	0
Total	$16,045,531	$6,907,087

C. Projected recognition of deferred outflows/(inflows)	2016	2017	2018	2019	2020	Thereafter
Deferred Inflows/(Outflows) Recognized In Future Pension Expense (Year Ended June 30)	$2,424,936	$2,424,936	$2,424,936	$2,424,936	$(561,294)	$0

EXHIBIT 5

Notes to Required Supplementary Information

Valuation date	Actuarial determined contributions for fiscal 2016 and fiscal 2017 are determined with January 1, 2015 actuarial valuation.
Actuarial cost method	Entry Age Normal Cost Method
Amortization method	Payments increase at 4.50% per year
Remaining amortization period	9 years from July 1, 2015
Asset valuation method	Market value of assets as reported in the System's Annual Statement less unrecognized return in each of the last five years. Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized over a five-year period, further adjusted, if necessary, to be within 10% of the market value.
Actuarial assumptions:	
Investment rate of return	7.75% (previously, 8.00%)
Discount rate	7.75% (previously, 8.00%)
Inflation rate	4.0% for 2015 and later years (previously, 4.50% for 2013 and later years)
Projected salary increases	Based on years of service, ranging from 6.00% at 0 years of service decreasing to 4.25% after 9 years of service (previously, 7.00% at 9 years of service decreasing to 4.75% after 9 years of service)
Cost of living adjustments	3% of first $12,000

Plan membership:	
Retired participants and beneficiaries receiving benefits	476
Inactive participants entitled to a return of their employee contributions	47
Inactive participants with a vested right to a deferred or immediate benefit	48
Active participants	1,090
Total	1,661

Changes in Assumptions:

Effective January 1, 2015:

- The net investment return assumption was lowered from 8.00% to 7.75%.
- The administrative expense assumption was increased from $390,000 for calendar 2013 to $525,000 for calendar 2015.
- The pre-retirement mortality assumption was changed from the RP-2000 Mortality Table projected 13 years using Scale AA to the RP-2000 Employee Mortality Table projected generationally from 2005 with Scale AA.
- The post-retirement mortality assumption for non-disabled participants was changed from the RP-2000 Mortality Table projected 13 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally from 2005 with Scale AA.
- The mortality assumption for disabled participants was changed from the RP-2000 Mortality Table set forward 2 years projected 13 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table set forward 2 years projected generationally from 2005 with Scale AA.
- The retirement rates were reduced by 25%.
- The salary increase assumption was changed as follows:

Years of Service	Rate	
	Current	Previously
0	6.00%	7.00%
1	5.50%	6.50%
2	5.50%	6.50%
3	5.25%	6.00%
4	5.25%	6.00%
5	4.75%	5.50%
6	4.75%	5.50%
7	4.50%	5.00%
8	4.50%	5.00%
9+	4.25%	4.75%

- The reduction in liability to account for anticipated net 3(8)(c) reimbursements was increased from $5.2 million to $7.2 million based on the average net 3(8)(c) payments in 2013 and 2014.

Changes in Plan Provisions:

None